CLAIMS

1. Method for the regeneration of used mineral oils for obtaining lubricant bases which comprises the following steps:

   (a) demetallization of the used mineral oil by means of chemical treatment of said oil with an aqueous solution of a chemical reagent containing anions which form low solubility salts with the metals of the oil, followed by the separation of the demetallized oil;

   (b) distillation of the demetallized oil obtained in step (a) at atmospheric pressure and in the presence of alkaline hydroxides; and

   (c) distillation of the bottom liquid obtained in the atmospheric distillation of step (b) under vacuum and in the presence of alkaline hydroxides to obtain lubricant bases.

2. Method according to claim 1, characterised in that the chemical reagent employed in (a) is an ammonium salt; and in that said reagent is used in a proportion of 0.5% to 5% by weight of ammonium salt in relation to the used oil.

3. Method according to claim 2, characterised in that the ammonium salt contains anions of the phosphate and sulphate groups, and can be monoammonium or diammonium phosphate, or monoammonium or diammonium sulphate, or a mixture thereof.

4. Method according to the previous claims, characterised in that in step (a) the chemical treatment is carried out in a continuous way in tubular reactors, or in one or several well-mixed reactors in series, or a combination of both systems; and where the reaction is carried out at temperatures between 120 °C and 180 °C, at pressures between 3 bar

and 11 bar and with residence times in the reactors between 10 minutes and 120 minutes.

5. Method according to the previous claims, characterised in that in step (a) the separation is carried out continuously by means of a flash vaporisation, so that at least a part of the water and the light hydrocarbons and solvents are vaporised, which are collected and decanted after their condensation, and a liquid is obtained, which after cooling down, is separated into a sludge containing the metal salts, an aqueous phase with the excess reagent and the demetallized oil.

6. Method according to claim 5, characterised in that the separation of the sludge containing the metal salts, the aqueous phase with the excess reagent and the demetallized oil is carried out by continuous centrifugation in one or two steps in series.

7. Method according to the previous claims, characterised in that in step (b) the demetallized oil is distilled continuously at atmospheric pressure in the presence of alkaline hydroxides, so that the remains of water, light hydrocarbons and solvents are distilled, along with the ammonia released by the effect of the alkaline hydroxides.

8. Method according to claim 7, characterised in that the distillate is subjected to condensation, followed by decanting, in such a way that an organic phase is obtained which contains light hydrocarbons and solvents and an aqueous phase which contains ammonia.

9. Method according to claim 8, characterised in that the non-condensables of the distillate are washed with water or with an aqueous solution of an acid to keep the ammonia in aqueous solution, which is added to the aqueous phase obtained in claim 8.

10. Method according to claims 7-9, characterised in that the atmospheric distillation is carried in a continuous way by flash vaporisation at temperatures between 200 ºC and 300 ºC.

11. Method according to the previous claims, characterised in that in step (c) the bottom liquid obtained in the atmospheric distillation of step (b) is vacuum distilled in a rectification column in a continuous way in the presence of alkaline hydroxides, preferably at a pressure between 2 mbar and 10 mbar at the top of the column and a column feed temperature between 310 ºC and 335 ºC, for obtaining a vacuum gas-oil or several fractions of lubricant bases as side cuts and a bottom with characteristics of fuel-oil or an asphalt component.

12. Method according to the previous claims, characterised in that the distillations of steps (b) and (c) are carried out in tubular heat exchangers, in which the demetallized oil obtained in step (a), or the bottom liquid obtained by atmospheric distillation in step (b), circulates at high speed inside the tubes and in which the heating fluid on the outside of these tubes is a thermal oil which circulates preferably at temperatures below 300 ºC in the atmospheric distillation and below 385 ºC in the vacuum distillation.

13. Method according to the previous claims, characterised in that the alkaline hydroxide employed in steps (b) and (c) is sodium hydroxide or potassium hydroxide, or a mixture of both, which is added preferably in a proportion of 0.5% to 5% in weight in relation to the demetallized oil, more preferably in a proportion of 0.5% to 3%, so that said addition is carried out completely before the atmospheric distillation, or a part before the atmospheric distillation and a part before the vacuum distillation.